

CLAIMS

What is claimed is:

1. A stabilized AlPO₄ composition comprising CaO, SiO₂ and AlPO₄ at a ratio of greater than 0 to less than about 4 mole percent CaO, greater than 0 to less than about 10 mole percent SiO₂, and greater than about 86 to less than about 100 mole percent AlPO₄.
2. The composition of Claim 1 comprising CaO, SiO₂ and AlPO₄ at a mole percent ratio of greater than 0 to less than about 3 CaO, greater than 0 to less than about 6 SiO₂, and greater than about 91 to less than about 100 AlPO₄.
3. The composition of Claim 1 comprising CaO, SiO₂ and AlPO₄ at a mole percent ratio of about 2.3 CaO, about 5.7 SiO₂, and about 92 AlPO₄.
4. A stabilized AlPO₄ composition comprising Xo, SiO₂ and AlPO₄ at a ratio of greater than 0 to less than about 4 mole percent Xo, greater than 0 to less than about 10 mole percent SiO₂, and greater than about 86 to less than about 100 mole percent AlPO₄, wherein X is any cation with an atomic radius of about 1 angstrom.
5. The composition of Claim 4 wherein X is selected from the group consisting of potassium and copper.
6. The composition of Claim 4 or 5 wherein the mole percent ratio is about 2.3 Xo, about 5.7 SiO₂, and about 92 AlPO₄.
7. A method for stabilizing AlPO₄ ceramic microstructures comprising the steps of:
 - a) admixing an acidic solution of AlPO₄ to solutions of SiO₂ and a calcium oxide source wherein the mole percent ratios are greater than about 86 to less than about 100 AlPO₄, greater than 0 to less than about 10 SiO₂, and greater than 0 to less than about 4 calcium;

- 1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
- b) raising the pH of the admixture to form a slurry; and
 - c) removing water to form the precipitate.
8. The method of Claim 7 wherein the acidity of the acidic solutions of step (a) is about 2.5.
9. The method of Claim 7 wherein the pH in step (b) is raised to about 9.
10. The method of Claim 7, 8 or 9 wherein the mole percent ratios are 0 to about 3 Ca, 0 to about 6 Si, and about 91 to about 100 Al.
11. The method of Claim 7, 8 or 9 wherein the mole percent ratios are about 2.3 Ca, about 5.7 Si, and about 92 Al.
12. An AlPO_4 composition that has a cubic structure, space group F-43m, with a ~ 7.2 Angstroms at a temperature of less than about 270°C.
13. A composition according to Claim 12 that is single phase.
14. A composition according to Claim 12 comprising a silica dopant and a dopant having a cation with an atomic radius of about 1 angstrom.
15. A composition according to Claim 14 wherein the dopant having a cation with an atomic radius of about 1 angstrom comprises CaO .
16. A composition according to Claim 12 wherein the cubic structure is maintained up to at least 1000°C.
17. A composition according to Claim 12 which is at a temperature in the range of from room temperature to about 250°C.